

OptiFlex³

SERVICE MANUAL



Model- 2090

Applies to Serial numbers 1000 and above

 **CHATTANOOGA**
GROUP A DIVISION OF **ENCORE**
MEDICAL
ISO 13485 CERTIFIED

TABLE of CONTENTS

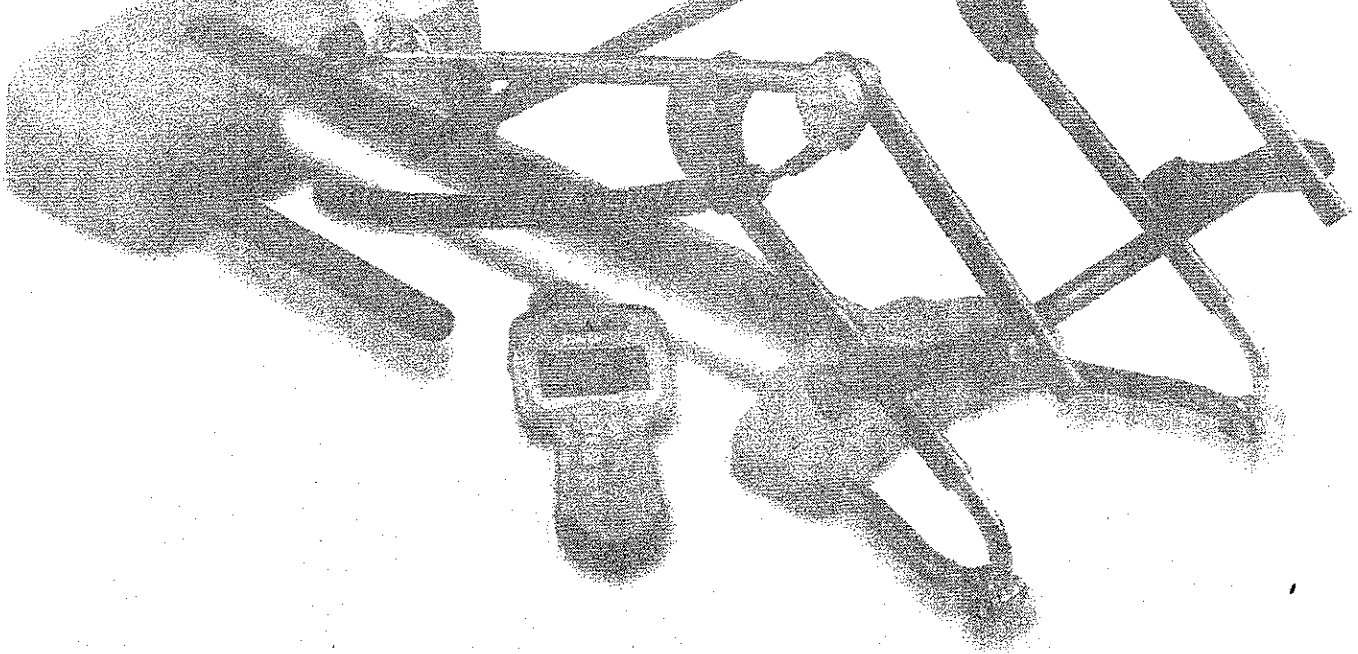
OptiFlex^{®3} Continuous Passive Motion (CPM) Therapy Unit

FOREWORD.....	1
1- THEORY OF OPERATION	2
2- SAFETY PRECAUTIONS	3-5
3- NOMENCLATURE	6-7
4- SPECIFICATIONS	8
5- TROUBLESHOOTING.....	9-14
5.1 OPTIFLEX ³ SOFTWARE ERROR MESSAGES	9
5.2 OPTIFLEX ³ SYSTEM TESTING	10
5.3 VISUAL INSPECTION.....	11
5.4 GROUND RESISTANCE TEST	11
5.5 LEAKAGE TESTS	11
5.6 FLEXION ANGLE AND CALIBRATION TEST.....	12-13
5.7 TRAVEL SPEED TEST	14
5.8 EMERGENCY START/STOP FUNCTION TEST.....	14
5.9 PENDANT DISCONNECT TEST.....	15
6- REMOVAL & REPLACEMENT.....	15-19
6.1 COVER REMOVAL & REPLACEMENT	15
6.2 MOTOR CONTROL BOARD REMOVAL & REPLACEMENT	16
6.3 DRIVE BELT REMOVAL & REPLACEMENT	17
6.4 MOTOR ASSEMBLY REMOVAL & REPLACEMENT	18-19
7- CALIBRATION	20-22
7.1 ANGLE POTENTIOMETER POSITION CALIBRATION	20-21
7.2 FORCE REVERSAL CALIBRATION	22
MAINTENANCE & CALIBRATION RECORD	23-24
8- PARTS.....	25-26
9- SCHEMATICS	27-30
10- WARRANTY	31

Read, understand, and follow the Safety Precautions and all other information contained in this manual.

This manual contains the necessary safety and field service information for those field service technicians, certified by Chattanooga Group, to perform field service on the OptiFlex³ CPM System.

At the time of publication, the information contained herein was current and up-to-date. However, due to continual technological improvements and increased clinical knowledge in the field of Continuous Passive Motion therapy, as well as Chattanooga Group's policy of continual improvement, Chattanooga Group reserves the right to make periodic changes and improvements to their equipment and documentation without any obligation on the part of Chattanooga Group.

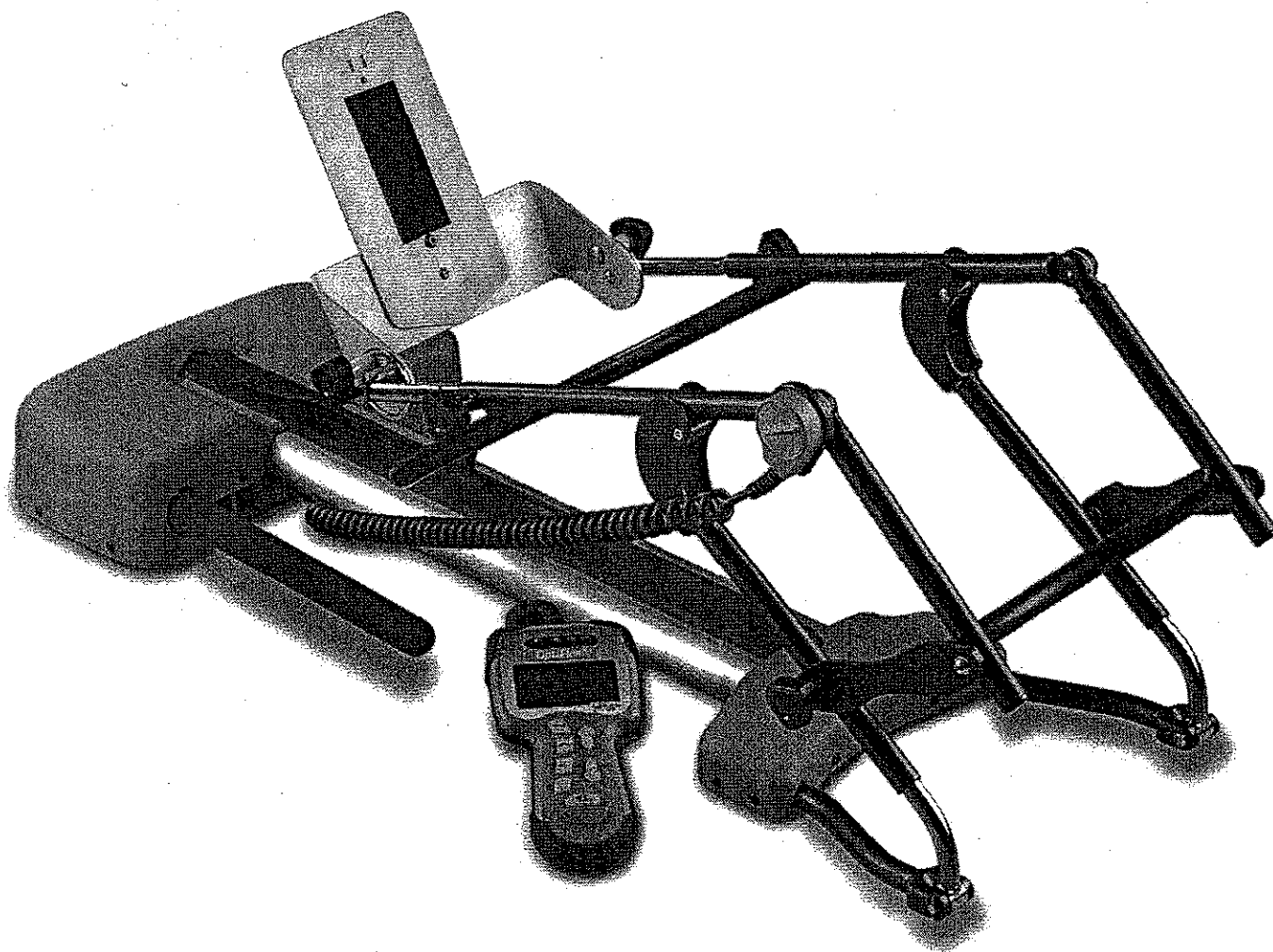


1.1 OVERVIEW

The OptiFlex³ CPM product is comprised of one Universal Power Supply and one Motor Control Board housed within the head section of the unit along with the Motor and Gearbox Assembly. These components are linked to a Pendant via a cable connection that provides the operator access for set up and operation of the unit. The basic components of the OptiFlex³ CPM units are Frame Base, Motor and Gearbox Assembly, Universal Power Supply, Motor Control PC Board, Adjustable Foot Plate, Adjustable Femur Bar and User Interface (Pendant).

The unit is designed for patient use only with the Patient Softgoods Kit (Part Number 20533). This single patient use softgoods kit is designed specifically for the OptiFlex³ CPM unit and provides proper installation and support to the patient during therapy.

If necessary, two units may be used simultaneously for patients that have been prescribed dual therapy by a licensed professional. If two units are prescribed for use simultaneously, use with the optional bed mount to secure the units in position during therapy.



2- SAFETY PRECAUTIONS

2.1 PRECAUTIONARY DEFINITIONS

The precautionary instructions found in this section and throughout this manual are indicated by specific symbols. Understand these symbols and their definitions before operating this equipment. The definition of these symbols are as follows;

A. Caution



Text with a "CAUTION" indicator will explain possible safety infractions that could have the potential to cause minor to moderate injury or damage to equipment.

B. Warning



Text with a "WARNING" indicator will explain possible safety infractions that will potentially cause serious injury and equipment damage.

C. Danger



Text with a "DANGER" indicator will explain possible safety infractions that are imminently hazardous situations that would result in death or serious injury.

D. Dangerous Voltage



Text with a "Dangerous Voltage" indicator serves to inform the technician of possible hazards resulting in the electrical charge disbursement from certain components if handled or serviced improperly.

E. Biohazard



Text with a "BIOHAZARD" indicator will explain possible safety infractions that could cause biohazardous conditions if the material is not properly handled and disposed of.

F. Note

Throughout this manual "NOTE" may be found. These Notes are helpful information to aid in the particular area or function being described.

2- SAFETY PRECAUTIONS

OptiFlex³ Continuous Passive Motion (CPM) Therapy Unit

2.2 PRECAUTIONARY INSTRUCTIONS

A. Cautions

CAUTION

- Read this manual before assembling or using OptiFlex³.
- Extreme caution should be taken when in use around children.
- Use OptiFlex³ only as described in this manual.
- Keep hair, loose clothing, fingers, and all parts of body away from moving parts of OptiFlex³.
- Turn power off before unplugging.
- Unplug the Power Cord by grasping the plug, not the cord.
- Damage may occur to OptiFlex³ if not transported and stored between 0° and 140°F (-18° to 60°C).
- Unplug Power Cord when not in use.
- Do not use if cord or plug is damaged.
- Use extra care when touching metal of OptiFlex³ after exposure to cold or heat.
- Condensation could result in damage of the OptiFlex³ if unit is subjected to periods of low temperatures followed by periods of high temperatures.
- OptiFlex³ is made from high impact materials. However, structural failure or hidden damage can be caused by shock, impact, or dropping the unit. Use care when transporting and storing unit to avoid equipment damage.
- To isolate the unit from the power source, disconnect the power cord at the wall outlet.
- OptiFlex³ should only be used after the operator has thoroughly read and understands the User Manual.
- Rapid increases in ROM can cause complications.

B. Warnings

WARNING

- Make certain that the unit is electrically grounded by connecting only to a grounded electrical service receptacle conforming to the applicable national and local electrical codes.
- Keep hair, loose clothing, loose bedding, fingers, and toes away from the hinge components of the unit.
- Do not use the OptiFlex³ outdoors or on wet or gel filled surfaces. Use only on firm, flat, stable level surfaces to ensure stability of the unit while in operation.
- Materials of the unit may become flammable or combustible if exposed to a source of ignition.
- Heat generated within the pendant may cause ignition of the pendant if wrapped in bedding or other materials.
- Do not use OptiFlex³ while smoking or around open flame.
- OptiFlex³ has been designed for maximum protection against the exposure of urinary incontinence. Precautionary measures should still be taken when any type of liquid comes in contact with an electrical apparatus.
- Always turn off and unplug unit from electrical source before servicing or cleaning. Failure to do so could result in electrical shock or personal injury.
- Handle the unit only when the unit is dry and hands are dry to prevent electrical shock.
- Do not use the OptiFlex³ as a toy.

2.2 PRECAUTIONARY INSTRUCTIONS (continued)

C. Dangers

DANGER



- DO NOT connect the unit to an electrical supply without first verifying that the power supply is the correct voltage. Incorrect voltage may cause unit damage, malfunction, electrical shock, fire, or personal injury. Your unit was constructed to operate only on the electrical voltage specified on the Voltage Rating and Serial Number Plate. Contact your Chattanooga Group dealer if the unit is not properly rated.
- Power Supplies retain High Voltage!



- Materials that have been in contact with bodily fluids must be handled and disposed of in accordance with National, Local, and Facility disposal rules, regulations, and procedures.
- Exercise caution when using accessories and auxiliary devices such as muscle stimulators, ColPaCs, and other modalities. Route lead wires, hoses, tubes, etc. away from the working mechanism of the OptiFlex³ to help prevent damage to the OptiFlex³ and any other modality used with it.
- Unconscious patients or patients under heavy influence of medication must be constantly attended and monitored while the OptiFlex³ is in use.
- The OptiFlex³ must be completely visible at all times during use. Never cover the unit with bedding or any other means of concealment while in operation.
- If the OptiFlex³ is used in conjunction with the optional OptiFlex "T" trolley, make certain the OptiFlex³ unit is resting on the mattress of the bed and the OptiFlex "T" is suspended with no weight on the casters to prevent possible movement of the unit and possible injury to patient.
- OptiFlex³ is a prescription device to be used only under the supervision of or by the order of a physician or other licensed healthcare provider.

3- NOMENCLATURE

3.1 OPTIFLEX³

The nomenclature graphic below, Figure 3.1, indicates the general locations of the major components of the OptiFlex³ CPM unit.

Know the components and their functions before performing any operation of or service to the OptiFlex³ CPM unit.

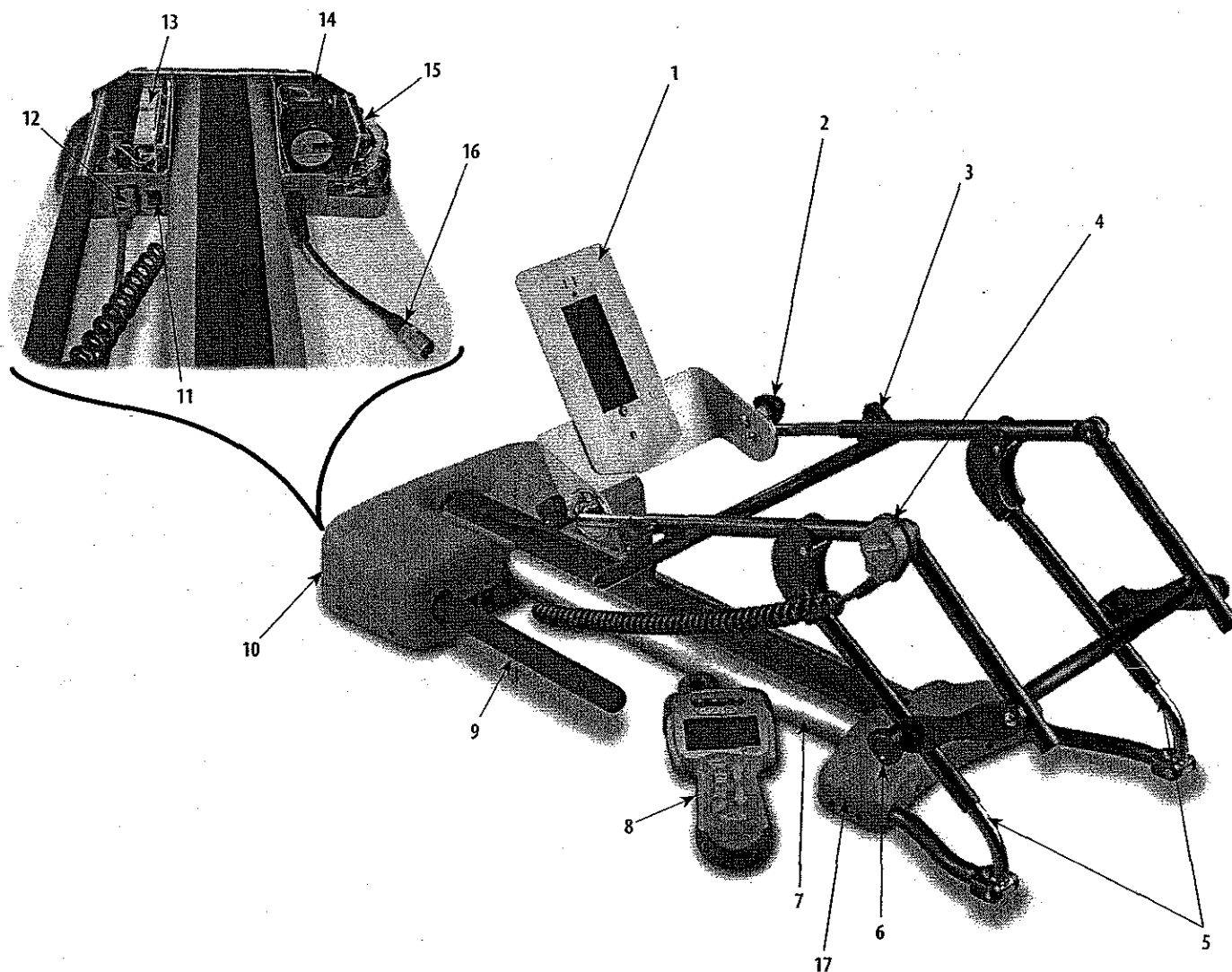


FIGURE 3.1

- | | |
|---|--------------------------------|
| 1. Adjustable Foot Plate | 10. Motor Cover |
| 2. Foot Rest Pivot Adjustment | 11. On/Off Switch |
| 3. Tibial Adjustment Knob | 12. Mains Power Cord |
| 4. Angle Potentiometer (Knee Pot) | 13. Universal Power Supply |
| 5. Femur Bar Adjustment Scale | 14. Motor and Gearbox Assembly |
| 6. Femur Bar Adjustment Knob | 15. Motor Control Board |
| 7. Frame Base | 16. Pendant Connector |
| 8. Pendant (User Interface)- See Page 7 | 17. Front Access Cover |
| 9. Carrying and Storage Handle | |

3- NOMENCLATURE

3.2 OPTIFLEX³ PENDANT

The Pendant nomenclature graphic below, Figure 3.2, indicates the location and functions of the OptiFlex³ CPM Pendant (user interface).

Know the components and their functions before performing any operation of or service to the OptiFlex³ CPM unit.



FIGURE 3.2

1. **OSCILLATION ZONE™**
Carriage will oscillate three times between the flexion angle and 10° less than the flexion angle.
2. **PROGRESSIVE *ROM™**
Unit will automatically increase the programmed flexion angle by 1° every hour up to a maximum of 5° per day.
3. **USER INTERFACE SCREEN**
Displays settings and status of therapy session.
4. **RESET**
Clear previous treatment settings and completed cycles.
5. **UP ARROW**
Allows user to increase treatment parameters.
6. **DOWN ARROW**
Allows user to decrease treatment parameters.
7. **COMFORT ZONE™**
Temporarily decreases the flexion ROM* when discomfort is experienced.
8. **EMERGENCY START/STOP**
Start or stop treatment.
9. **EXTENSION/FLEXION DELAY**
Allows user to program carriage to stop at both the extension and flexion angle for the time programmed.
10. **SPEED**
Displays the speed of operation.
11. **FLEXION**
Displays the flexion angle.
12. **EXTENSION**
Displays the extension angle.
13. **MODE**
Used with Fast Back, Oscillation Zone, and Progressive ROM*.
14. **FAST BACK™**
Carriage will slow down within 15° of the flexion angle.

* ROM= Range of Motion

4- SPECIFICATIONS

OptiFlex[®] 3 Continuous Passive Motion (CPM) Therapy Unit

4.1 OPTIFLEX³ CPM SYSTEM SPECIFICATIONS

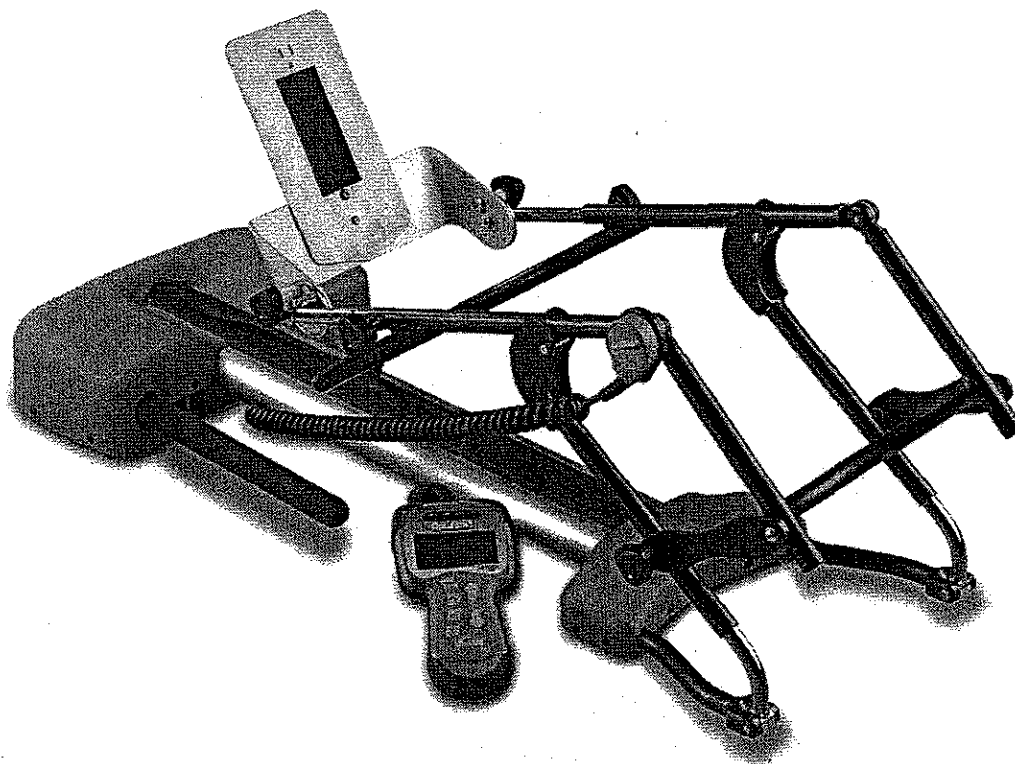


FIGURE 4.1

ELECTRICAL

Input..... 100-240 VAC, 50/60 Hz, 75 VA
Weight 27 lbs (12 kg)
Length..... 37 in (94 cm)
Electrical Class Class I
Electrical Type..... Type B ⚡

OPERATION

Flexion 120° Maximum
Extension..... -10° Maximum Hyper Extension
Speed..... 30° per min. to 150° per min
Maximum Patient Weight..... 350 lbs (159 kg)
Lower Leg Length Range..... 10-23.5 in (25.4- 59.7 cm)
(Center of knee to sole of heel)
Thigh Length Range 12-19 in (30.5-48.3 cm)
(Hip joint to center of knee)

TRANSPORTATION AND STORAGE REQUIREMENTS

Unit should be transported and stored under the following conditions:

Temperature..... 0° F to 140° F (-18° C to 60° C)
Humidity..... 0% to 75% Relative Humidity

REGULATORY COMPLIANCE

UL 60601-1
CAN/CSA C22.2 No. 601.1-M90 w/AZ
IEC/EN 60601-1, 60601-2
Meets MDD 93/42/EEC, CE 0413
Suitable for continuous operation.



ADDITIONAL SYMBOL DEFINITIONS

- | Standby Power ON
- ⏏ Emergency Stop
- ⚡ Type B Equipment
- ⏻ Standby Power OFF
- ▶ Start
- ⚠ Consult accompanying documentation

5- TROUBLESHOOTING

5.1 OPTIFLEX³ SOFTWARE ERROR MESSAGES

A. The information provided below is intended to aid in troubleshooting Software Error Messages of the OptiFlex³ units to "Board Level" only. No component level troubleshooting information is or will be provided by Chattanooga Group for field troubleshooting of board components.

B. Once a particular PCB has been determined as bad, replace the suspected board.

ERROR	ERROR DEFINITION	PROBABLE CAUSE	POSSIBLE REMEDY
1 & 2	Pendant isn't communicating correctly with unit.	Defective Cable, Pendant, or Motor Control Board.	Replace the Cable, Pendant, or Motor Control Board.
3	Error reading the EEPROM on the motor pcb.	Defective Cable, Pendant, or Motor Control Board.	Replace the Cable, Pendant, or Motor Control Board.
5	RTC battery voltage is too low indicating bad battery.	Pendant Battery voltage is low.	Replace Pendant.
6	A general error on the motor pcb has occurred.	Motor Control Board Failure.	Replace the Motor Control Board.
7	The Angle Potentiometer sensor is out of range.	Carriage angle below -10° limit.	Loosen the Femur Adjustment Knobs. Raise the carriage to above zero and tighten the Femur Adjustment Knobs. Turn the unit off and back on with the power switch.
8	The Angle Potentiometer is not changing when the carriage is supposed to be moving.	Carriage obstruction or the Angle Pot Screw is loose.	Remove the obstruction. Tighten the Angle Potentiometer Screw and Calibrate unit.
9	The motor tachometer does not match expected value.	Motor Control Board Failure.	Replace the Motor Control Board.
10	The motor pcb has not communicated with the pendant in a reasonable amount of time.	Motor Control Board Failure.	Replace the Motor Control Board.
11	The motor pcb was reset via the watchdog.	Motor Control Board Failure.	Replace the Motor Control Board.
	Unit needs to be calibrated.	Various.	Calibrate unit. Refer to pages 20-22 for calibration procedures.

5.2 OPTIFLEX³ SYSTEM TESTING

A. General

1. The following information is intended to aid in troubleshooting the major components of the OptiFlex³ units to "Board Level" only. These tests are OEM standard testing procedures and methods used at the factory before shipment of any OptiFlex³ unit.
2. Due to the complex nature of the technology utilized by Chattanooga Group, the recommended troubleshooting techniques are to determine "Bad Board" and board replacement only. No board component level troubleshooting is recommended nor will information or parts be supplied by Chattanooga Group. Any board component level troubleshooting performed will be at sole risk and liability of the Service Technician performing such troubleshooting techniques.
3. Once a particular PC Board has been determined to be bad, replace the board only with Chattanooga Group OEM replacement parts and hardware.

B. Special Tools, Fixtures, and Materials Required

1. Certain tests require the use of special tools and fixtures. These will be listed at the particular test where they are required. Testing with any other special tool or fixture other than those stated could give erroneous readings or test results. Always perform the tests exactly as stated to ensure accurate results.
2. Standard test equipment settings will be listed for each test performed to aid in performing the test to OEM standards and to ensure proper readings.
3. The troubleshooting and repair of the OptiFlex³ units should be performed only by authorized technicians trained and certified by Chattanooga Group.

C. Equipment Required

1. Digital Multimeter
2. Dielectric Withstand (Hi-Pot) and ground resistance tester
3. Milliohm Meter
4. Calibrated SHIMPO Model MF-100 Mechanical Force Gauge or approved equivalent
5. Sharp tipped tool for removing decals.
6. Tape Measure or Ruler.

NOTE:

Adjust Dielectric Withstand tester to indicate fault with 120 k Ohm Load across the output when at specified test voltage.

CAUTION

The following tool, lubrication, and locking compound requirements are critical to component removal and replacement of the OptiFlex³.

All hardware, bolts, nuts, and screws used to assemble the OptiFlex³ are SAE Standard. Due to the size of these components, no metric equivalent is available. Therefore, it will be necessary to obtain the proper size tools for removal and replacement of certain components.

The lubricants and locking compounds listed below are crucial in the assembly of certain components to ensure patient safety and efficient operation of the unit. Use only the recommended products listed or an approved equivalent possessing the same properties and qualities.

4. Required SAE Tools

#1 Phillips Screwdriver

#2 Phillips Screwdriver

Preset and calibrated, 5 inch pound "T"-Handle Torque Wrench with 1/4" square drive and 5/64" straight hex key socket

Preset and calibrated, 10 inch pound "T"-Handle Torque Wrench with 1/4" square drive and 9/64" straight hex key socket

5/16" Socket Driver

3/32" Allen Wrench

5. Required Lubricants

Molykote 33 Grease (Light Pink) by Dow Corning

MolyGraph Grease (Black) by Sta-Lube

6. Required Locking Compound and Primer

Type N Primer by Loctite

Loctite 222 (Purple)

Loctite 242 (Blue)

Loctite 262 (Red)

Loctite 609 (Green)

7. Inclinator, Protractor, or Goniometer accurate to 1°

8. Certified, calibrated Stop Watch

NOTE:

The tool, lubricant, and locking compound requirements will be listed at their respective removal and replacement procedures throughout this manual.

5.3 VISUAL INSPECTION

A. General

Visually inspect the OptiFlex³ unit. A visual inspection can, to an experienced Technician, indicate possible abuse of the unit and internal problems.

5.4 GROUND RESISTANCE TEST

A. Voltage Specifications

Input: 100-240 VAC, 50/60 Hz, 75 VA

B. Specification

Maximum Acceptable Resistance: 100 milliohms

C. Equipment Required

Milliohm Meter

D. Test

Place unit on level work surface.

Place one meter probe on the ground prong of the Mains Power Cord and the other to any exposed metal or screw on the unit. See Figure 5.1.

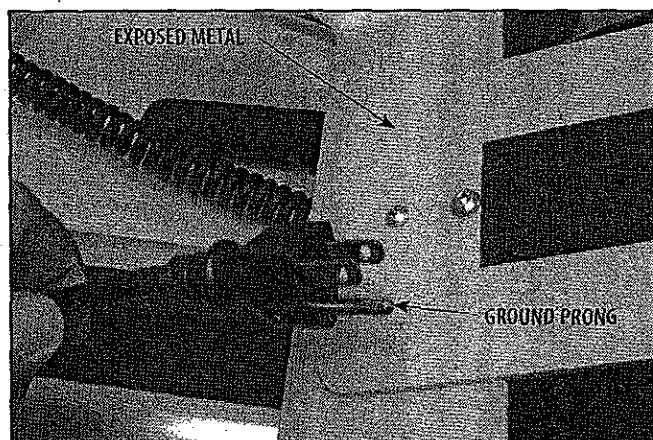


FIGURE 5.1

NOTE:

USA Power Cord is illustrated. Actual Power Cord will vary from country to country.

5.5 LEAKAGE TESTS



WARNING

UNIT FAILING DIELECTRIC WITHSTAND AND/OR LEAKAGE TESTS COULD INDICATE SERIOUS INTERNAL SYSTEM PROBLEMS.

DO NOT PLACE UNIT BACK INTO SERVICE!
SEND UNIT TO FACTORY FOR REPAIR! DO NOT ATTEMPT TO REPAIR IN THE FIELD!

Test Voltage Spec.....1000 V

Conduct all necessary leakage tests as required per "Chapter 7 Electrical Equipment" of the 1999, or later edition of the NFPA (National Fire Protection Association) "Health Care Facilities" standards. See Figure 5.2.

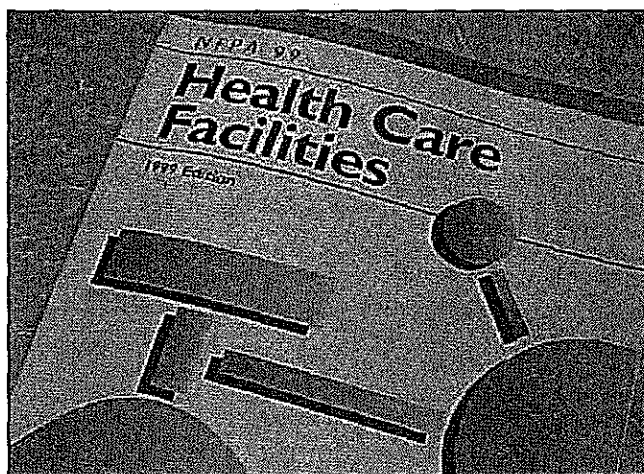


FIGURE 5.2

5- TROUBLESHOOTING

5.6 FLEXION ANGLE & CALIBRATION TEST

Specification $90^{\circ} \pm 3^{\circ}$

A. Equipment Required

Inclinometer, Protractor, or Goniometer accurate to 1° .

B. Test

1. Place unit on level work surface.
2. Plug Power Cord into grounded wall outlet with appropriate voltage. See Specifications on page 8.
3. Connect Pendant to unit and turn unit power ON.
4. Press and hold the Extension button. While holding the Extension button down, press the Down Arrow button until 0 is displayed on the Pendant. See Figure 5.3.

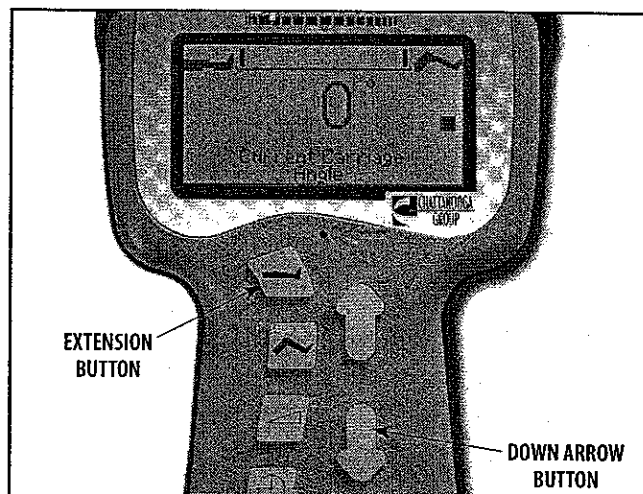


FIGURE 5.3

5. Press and hold the Time and Extension buttons. While holding the Time and Extension buttons, press the Up or Down Arrow button until 5 Sec is displayed on the Pendant. See Figure 5.4.

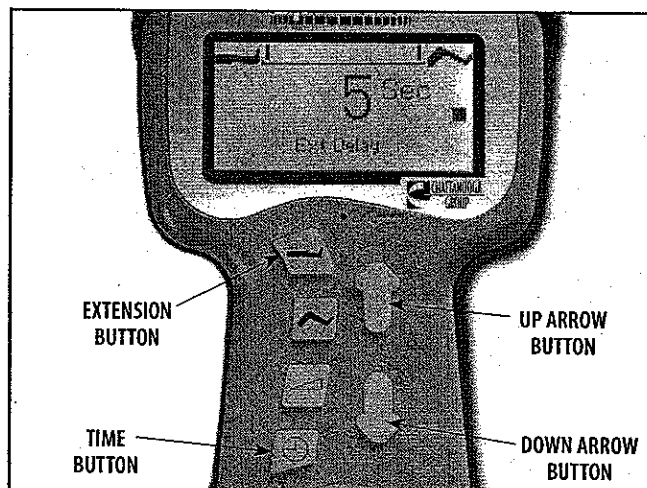


FIGURE 5.4

6. Press and hold the Time and Flexion buttons. While holding the Time and Flexion buttons, press the Up or Down Arrow button until 5 Sec is displayed on the Pendant. See Figure 5.5.

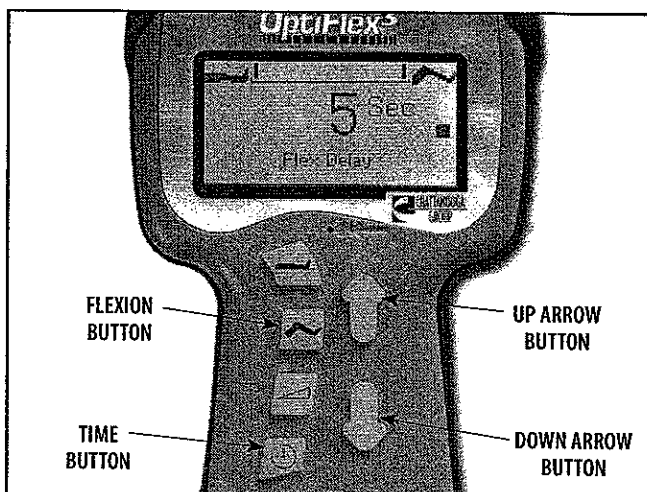


FIGURE 5.5

7. Press and hold the Flexion button. While holding the Flexion button down, press the Up Arrow button until 90° is displayed on the Pendant. See Figure 5.6.

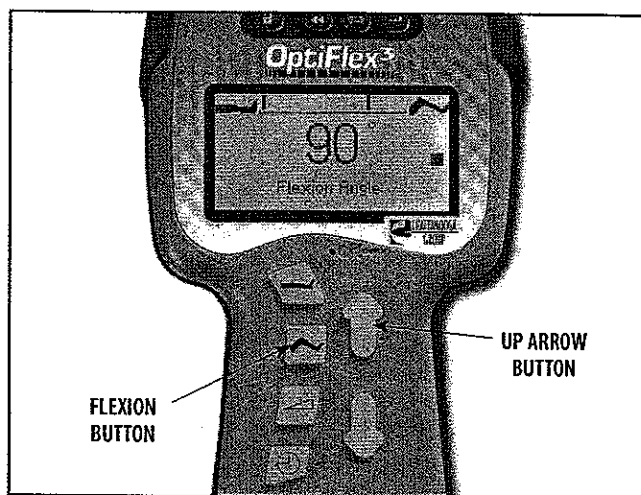


FIGURE 5.6

8. Press and hold the Speed button. While holding the Speed button down press the Up or Down Arrow button until 90° /Min is displayed on the Pendant. See Figure 5.7.
9. Press the Emergency Start/Stop button on the Pendant. When movement of the unit stops, press the Emergency Start/Stop button. Verify the display reads 90° /Min.

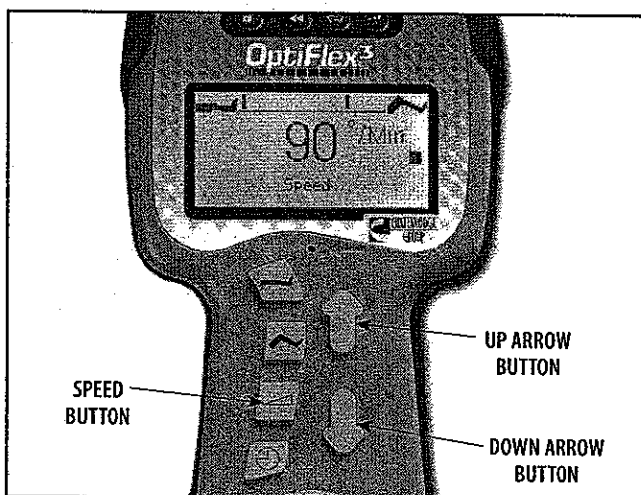


FIGURE 5.7

10. Using the Inclinator or Protractor, measure the angle of the flexion of the unit. See Figure 5.8.

NOTE:

In Figure 5.8, a Digital Inclinator is used to measure each side and the two numbers are added together.

If angle is out of specified range, perform Potentiometer Position Calibration.

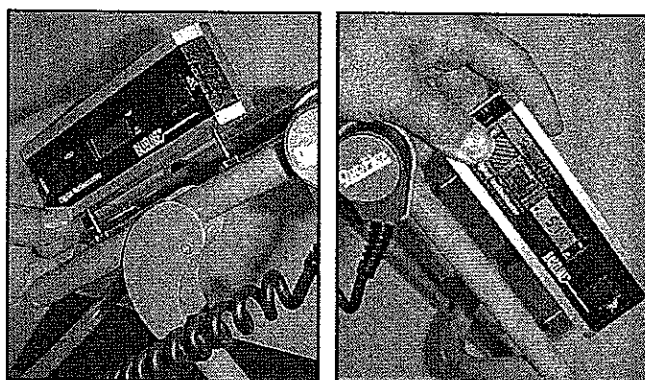


FIGURE 5.8

5- TROUBLESHOOTING

5.7 TRAVEL SPEED TEST

Spec 0° to 90° in 60 Sec ±10%

A. Equipment Required

Calibrated stop watch

B. Test

1. Set unit up as described in the "Flexion Angle Test."
2. Move to 0° by pressing the Emergency Start/Stop button. When motion stops and Display reads 0°, press the Emergency Start/Stop button to stop the unit. Then, simultaneously press the Emergency Start/Stop button and the stop watch start button. The unit should move from 0° to 90° within the specification listed above.
3. Repeat and record results three times. Record the average.
4. If unit fails test:
 - a. Check Pendant Cable connector to Motor Control Board.
 - b. Replace Motor Control Board.
 - c. Replace Pendant.

5.8 EMERGENCY START/STOP FUNCTION TEST

Spec Unit start or stop upon pushing button

A. Equipment Required

OptiFlex³ with Pendant

B. Test

1. Place unit on a level work surface.
2. Plug unit power cord into grounded wall outlet with appropriate voltage. See Specifications on page 8.
3. Connect Pendant to unit and turn unit power ON.
4. Press the Emergency Start/Stop button to start and stop the unit. Repeat several times.
5. If unit fails test:
 - a. Check Pendant Cable connector to Motor Control Board.
 - b. Replace Motor Control Board.
 - c. Replace Pendant.

5.9 PENDANT DISCONNECT TEST

Spec Unit stops immediately upon Pendant disconnect

A. Equipment Required

OptiFlex³ with Pendant

B. Test

1. Place unit on a level work surface.
2. Plug unit power cord into grounded wall outlet with appropriate voltage. See Specifications on page 8.
3. Connect Pendant to unit and turn unit power ON.
4. Press the Emergency Start/Stop button to start the unit.
5. Disconnect the Pendant from the unit while moving. Unit should stop.
6. If unit fails test:
 - a. Check Pendant Cable connector to Motor Control Board.
 - b. Replace Motor Control Board.
 - c. Replace Pendant.

6- REMOVAL & REPLACEMENT

OptiFlex®³ Continuous Passive Motion (CPM) Therapy Unit

6.1 Cover Removal & Replacement

WARNING

Unplug the unit from the power source before attempting any removal or replacement procedures to prevent electrical shock.

A. Motor Cover Removal

Remove the 11 Male Push Rivets from the Motor Cover by hand. See Figure 6.1

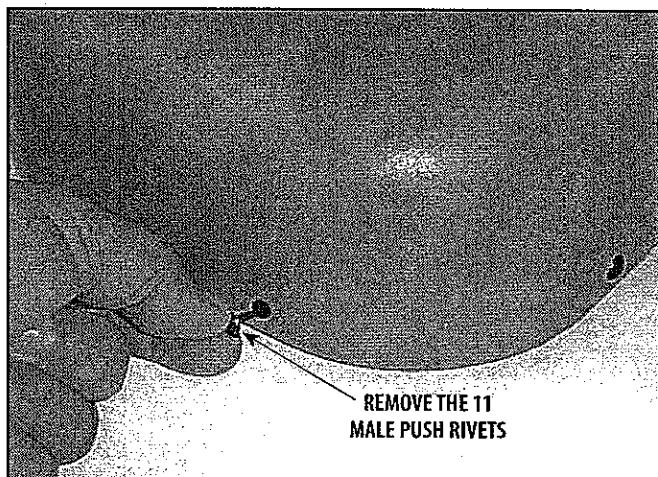


FIGURE 6.1

Remove the 11 Female Push Rivets from the Motor Cover by hand. See Figure 6.2.

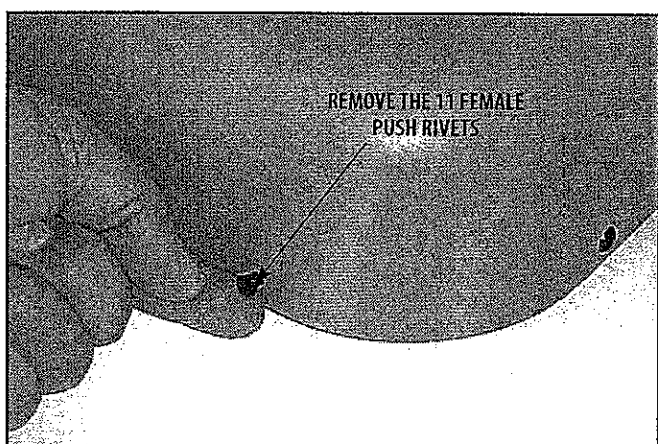


FIGURE 6.2

Lift up and rotate the Motor Cover toward the carrying handle of the unit. Slide the cover over the carrying handle to completely remove from the unit.

NOTE:

If carriage is close to full Extension, there may not be sufficient clearance to remove cover.

NOTE:

Retain both components of the push rivets for reinstallation.

B. Rear Access Cover

Remove the 8 Male Push Rivets from the Front Access Cover by hand. See Figure 6.3.

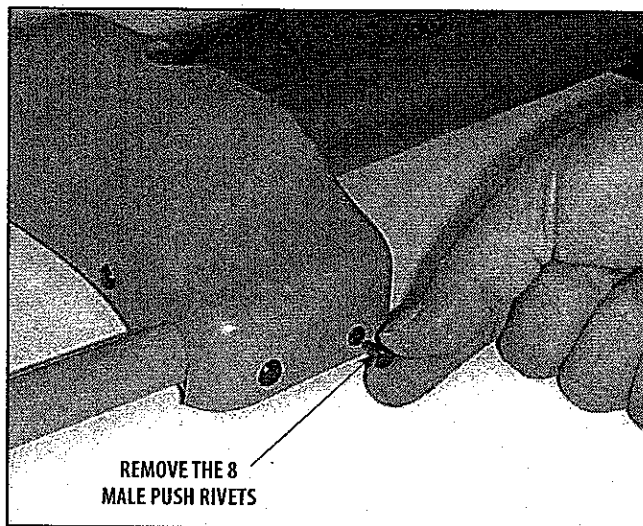


FIGURE 6.3

Remove the 8 Female Push Rivets from the Front Access Cover by hand. See Figure 6.4.

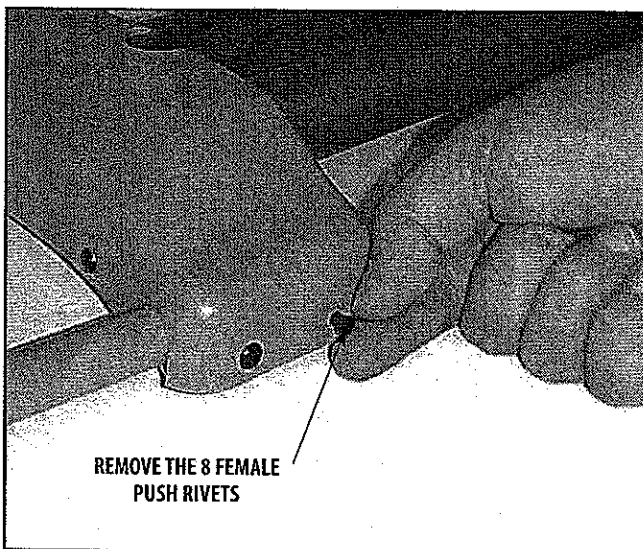


FIGURE 6.4

C. Replacement Component Part Numbers

Push Rivet (Male & Female Components)... J6004
Motor Cover..... J6089
Front Access Cover..... J6103

D. Replacement

Replace both covers in reverse order of removal.

6- REMOVAL & REPLACEMENT

OptiFlex[®] 3 Continuous Passive Motion (CPM) Therapy Unit

6.2 Motor Control Board Removal & Replacement

A. Tools Required

#2 Phillips Screwdriver



WARNING

Unplug the unit from the power source before attempting any removal or replacement procedures to prevent electrical shock.

B. Motor Cover Removal

Remove Motor Cover. Refer to "6.1. Cover Removal & Replacement".

C. Motor Control Board Removal

Disconnect the four wiring harnesses from the Motor Control Board. See Figure 6.5.

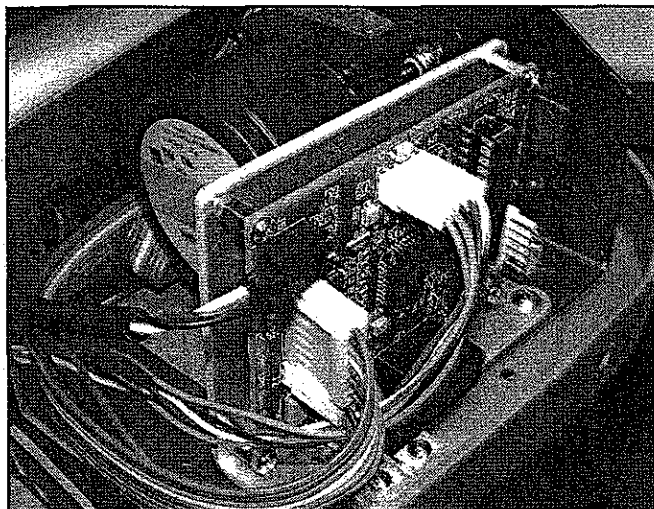


FIGURE 6.5

Using the #2 Phillips Screwdriver, remove the two mounting screws securing the Motor Control Board Assembly to the unit. See Figure 6.6.

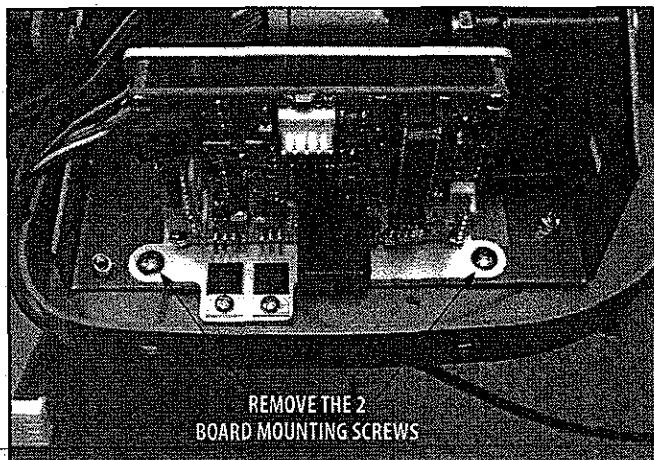


FIGURE 6.6

D. Replacement Component Part Numbers

Motor Control Board Assembly. J6088

E. Motor Control Board Replacement

Replace in reverse order. When connecting harnesses, each harness will connect only to their respective locations on the board.

After Motor Control Board replacement perform the following in the order listed:

7.1 Potentiometer Position Calibration

7.2 Force Reversal Calibration

5.4 Ground Resistance Test

5.5 Leakage Tests

5.6 Flexion Angle and Calibration Test

5.7 Travel Speed Test

5.8 Emergency Start/Stop Function Test

5.9 Pendant Disconnect Test

6.3 Drive Belt Removal & Replacement

A. Tools Required

- #2 Phillips Screwdriver
- 9/64" Allen Wrench
- Preset 10 inch-pound "T"-Handle Torque Wrench



WARNING

Unplug the unit from the power source before attempting any removal or replacement procedures to prevent electrical shock.

B. Motor Cover Removal

Remove Motor Cover. Refer to "6.1. Cover Removal & Replacement".

C. Belt Removal

Loosen the three Motor Mounting Screws. See Figure 6.9.

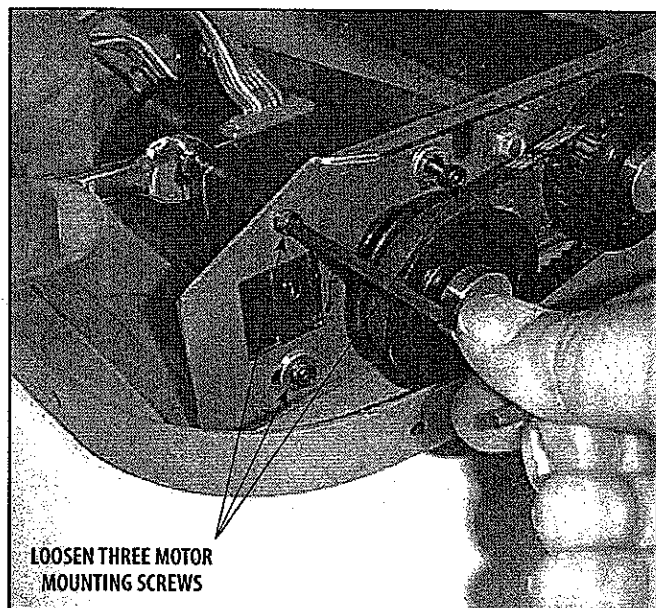


FIGURE 6.9

Rotate the motor toward the center of the unit to loosen the tension from the belt. Tighten the one Motor Mounting Screw in the upper left corner.

Remove the old belt from the pulleys.

D. Drive Belt Replacement Part Number

Motor Drive Belt J2000

E. Drive Belt Replacement

Replace Drive Belt in reverse order.

Rotate motor by hand, applying tension to the belt. Make certain the belt is seated into the pulley teeth.

Torque Motor Mounting screws using the Preset 10 inch-pound "T"-Handle Torque Wrench with 9/64" straight hex key socket.

After Drive Belt replacement perform the following in the order listed:

7.1 Potentiometer Position Calibration

7.2 Force Reversal Calibration

5.6 Flexion Angle and Calibration Test

5.7 Travel Speed Test

5.8 Emergency Start/Stop Function Test

6- REMOVAL & REPLACEMENT

OptiFlex[®] 3 Continuous Passive Motion (CPM) Therapy Unit

6.4 Motor Assembly Removal & Replacement

A. Tools Required

- 11/32" Open End Wrench
- #2 Phillips Screwdriver
- 5/64" Allen Wrench
- 9/64" Allen Wrench
- 3/32" Allen Wrench
- Preset 10 inch-pound "T"-Handle Torque Wrench
- Preset 5 inch-pound "T"-Handle Torque Wrench
- Type N locking compound primer
- Loctite 222 (Purple) or approved equivalent
- Molykote or approved equivalent grease

WARNING

Unplug the unit from the power source before attempting any removal or replacement procedures to prevent electrical shock.

B. Motor Cover Removal

Remove Motor Cover. Refer to "6.1. Cover Removal & Replacement".

C. Motor Control Board Removal

Remove Motor Control Board. Refer to "6.2 Motor Control Board Removal & Replacement".

D. Motor Removal

Remove Drive Belt. Refer to "6.3 Drive Belt Removal and Replacement".

Loosen three motor mounting screws. Rotate motor to release belt tension and remove belt. See Figure 6.10.

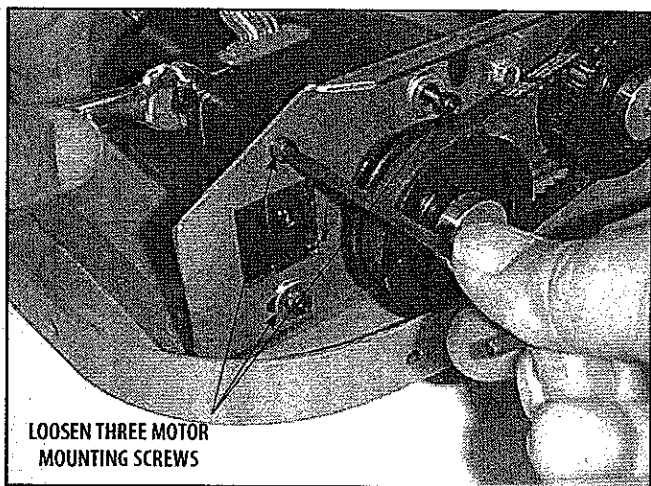


FIGURE 6.10

Using the 5/64" Allen Wrench, remove the set screw from the motor pulley. See Figure 6.11.

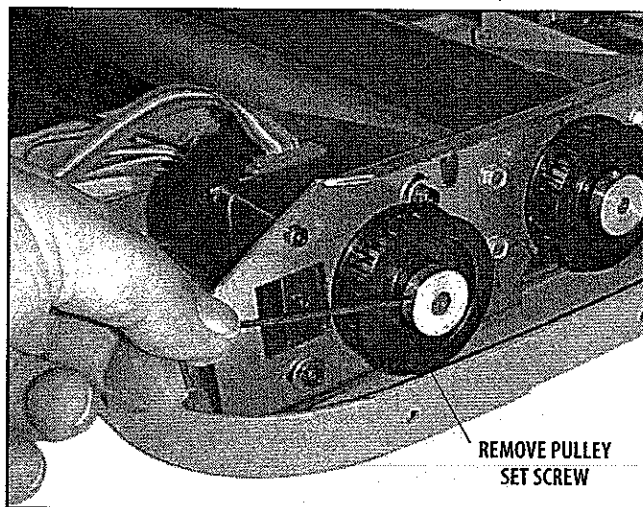


FIGURE 6.11

Remove Pulley from shaft.

NOTE:

It may be necessary to use a gear puller in removing the pulley.

Remove the three motor mounting screws using the 9/64" Allen Wrench and remove motor from unit. See Figure 6.12.

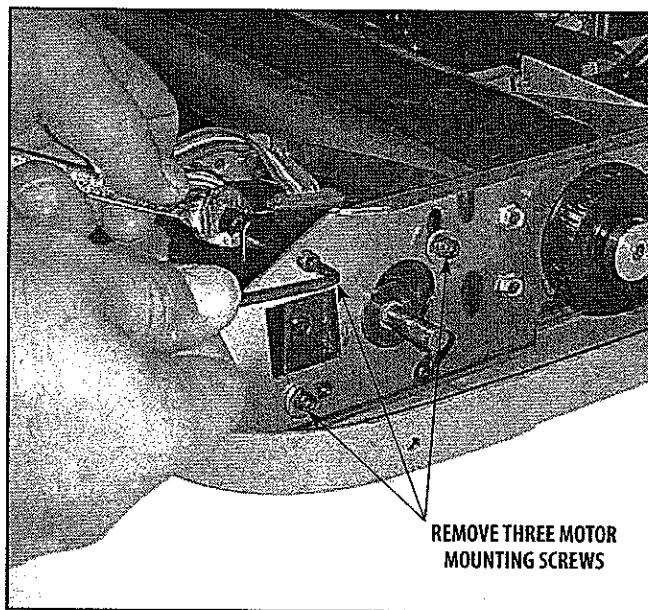


FIGURE 6.12

6.4 Motor Assembly Removal & Replacement (continued)

E. Replacement Component Part Numbers

Motor.....	21176
Gearbox Assembly.....	40100

F. Motor Replacement

1. Position the motor in the unit with ribbon cable up. Install the three Motor Mounting Screws and Nylon Lock Nuts. Do not completely tighten.
2. Position the pulley onto the motor shaft. Make certain the set screw hole is aligned with the flat area of the shaft.
3. Push the pulley onto the shaft until the face of the pulley collar is flush with the end of the motor shaft.
4. Prime the pulley set screw with the Type N primer and apply the Loctite 222 or approved equivalent per the manufacturer's instructions to the threads of the set screw.
5. Install the set screw until seated against motor shaft and then torque using the Preset 5 inch-pound "T"-Handle Torque Wrench with 5/64" straight hex key socket.
6. Rotate motor and place belt onto both pulleys. Rotate motor in the opposite direction until belt is tight. Tighten the three motor mounting screws and torque using the Preset 10 inch- pound "T"-Handle Torque Wrench with 9/64" straight hex key socket.
7. Replace the Motor Control Board. Refer to "6.2 Motor Control Board Removal & Replacement".
8. Replace Motor Cover. Refer to "6.1. Cover Removal & Replacement".
9. After Motor replacement, perform the following in the order listed:
 - 7.1 Potentiometer Position Calibration
 - 7.2 Force Reversal Calibration
 - 5.6 Flexion Angle and Calibration Test
 - 5.7 Travel Speed Test
 - 5.8 Emergency Start/Stop Function Test

7.1 Angle Potentiometer Position Calibration

The following procedure constitutes the required calibration of the Angle Potentiometer. Perform this procedure annually.

A. Tools Required

- #2 Phillips Screwdriver
- Calibrated and certified Protractor with 1° accuracy or other angle measuring device calibrated with 1° accuracy
- Digital Multimeter
- Sharp tipped tool for removal of potentiometer decal
- 3/32" Allen Wrench
- Preset 5 inch-pound "T"-Handle Torque Wrench
- Tape Measure

B. Potentiometer Decal and Cover Removal

Using a tool with a sharp tip (pocket knife), carefully remove the decal from the potentiometer cover. See Figure 7.1.

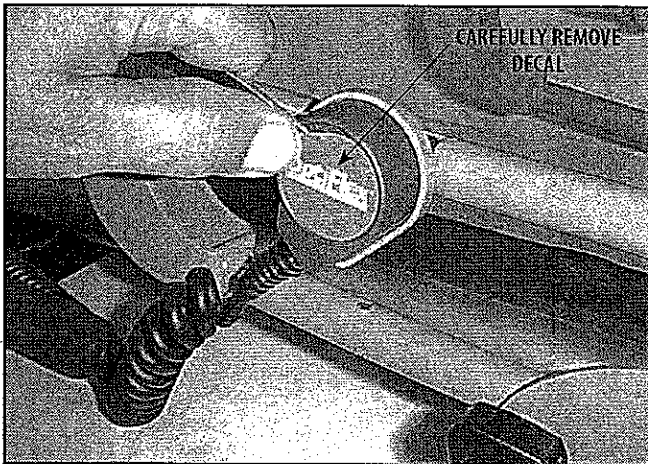


FIGURE 7.1

NOTE:

Be careful not to damage decal as it will be used for re-installation after the calibration procedure is complete.

Using the #2 Phillips Screwdriver, remove the three potentiometer cover mounting screws. See Figure 7.2.

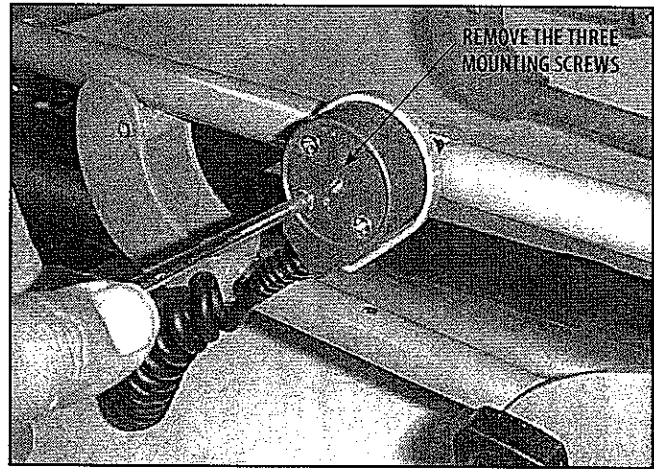


FIGURE 7.2

C. Initial Position Calibration Procedure

1. Enter the "Calibration Mode" of the Pendant by pressing and holding the "Comfort Zone" button.
2. While holding down the "Comfort Zone" button, press the following buttons in the sequence listed:
 - a. Progressive ROM
 - b. Fast Back
 - c. Oscillation Zone
 - d. Mode
3. Release the "Comfort Zone" button. "Calibration Mode Move to 0 deg." should be displayed at the bottom of the Pendant display window. See Figure 7.3.

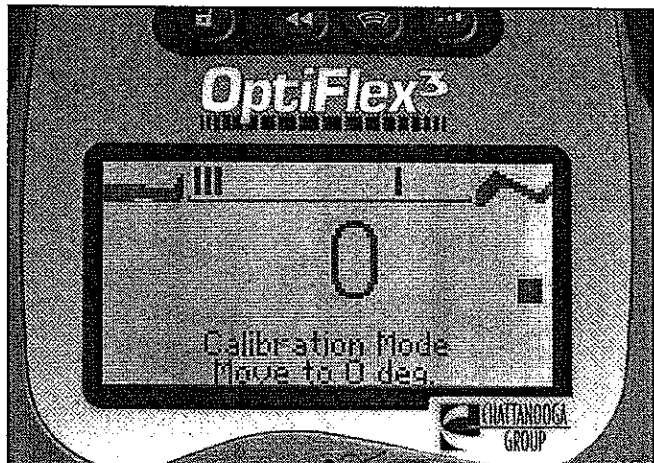


FIGURE 7.3